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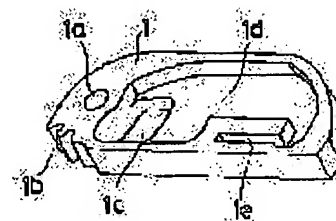
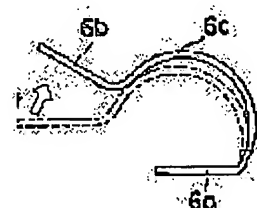
(21)Application number : 08-013728 (71)Applicant : CANON INC
 (22)Date of filing : 30.01.1996 (72)Inventor : ICHINO KAZUSHIGE
 YOSHII HIROSHI

(54) BARRIER DEVICE AND CAMERA EQUIPPED WITH THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent a barrier mechanism from becoming large in size due to the installation of an absorption spring, and also, to maximize the elasticity limit of the absorption spring, by assembling an elastic member with the barrier member.

SOLUTION: A counterbore part 1d is formed on the rear side of a main barrier 1, and the linear spring shaped absorption spring 6 is stored in the counterbore part 1d. And in order to make the absorption spring 6 satisfactorily show the elastic force without exceeding the elasticity limit of the absorption spring 6, it is required to make the deformed part 6c longer, then, the counterbore part 1d of the main barrier 1 is formed by using an area on the rear side of the barrier 1 as large as possible. Besides, the deformed part 6c is formed not to a straight line shape, but to a curved shape so as to be made longer and fitted with the shape of the counterbore surface. Thus, although the absorption spring 6 is a torsion spring, a full function can be obtained without the coil part.



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CLAIMS

[Claim(s)]

[Claim 1] Barrier equipment characterized by incorporating said elastic member inside said barrier member in barrier equipment which has a driving member which carries out closing motion actuation of a wrap barrier member and this barrier member for a front face of a taking lens, and an elastic member which absorbs recess migration of said driving member to said barrier member in the condition of having closed.

[Claim 2] Barrier equipment according to claim 1 characterized by including said elastic member in a side which counters said taking lens in said barrier member.

[Claim 3] Barrier equipment according to claim 1 or 2 characterized by forming said elastic member in the direction of an optical axis of said taking lens with a wire rod at a configuration which has only thickness for a wire size.

[Claim 4] Barrier equipment according to claim 3 characterized by having a portion at which said elastic member turned in a field which intersects perpendicularly with said optical axis.

[Claim 5] A camera characterized by equipping either of claims 1-4 with barrier equipment of a publication.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] It is related with a camera with the protection barrier which can be opened and closed in the front face of a lens barrel.

[0002]

[Description of the Prior Art] The protection barrier which can be opened and closed in the front face of a lens barrel is prepared, when not taking a photograph, a lens becomes dirty to a camera or there are a blemish and a thing protected so that there may be nothing in it.

[0003] The conventional barrier closing motion device is explained using drawing 11 - drawing 13. The barrier 101, 102 of two sheets is being fixed to the non-illustrated cope plate pivotable centering on centers of rotation 101a and 102a. The cope plate is arranged in the front face of a lens barrel, and lighting hole 103a which forms an optical path required for photography is opened in this cope plate. Furthermore, centering on the optical axis, the closing motion ring 104 is attached in the cope plate pivotable, and this closing motion ring 104 is energized in the direction of the clockwise rotation in drawing with the actuation spring (hauling spring) 105 hooked at spring credit section 103b of a cope plate.

[0004] In addition, when the closing motion ring 104 rotates in the location which makes the barrier 101, 102 open, revolution stopper 103c which prevents the revolution to the direction of a clockwise rotation beyond it of this closing motion ring 104 is formed in the cope plate.

[0005] Arms 101b and 102b are formed in the barrier 101, 102, and the absorption spring (hauling spring) 106 which energizes the barrier 101, 102 in the close direction is attached between parts for this arm 101b and 102b, and the revolution ring 104. Moreover, open stopper 104a is formed in the revolution ring 4, and when the barrier 101, 102 opens, and Arms 101b and 102b contact open stopper 104a, open actuation of the barrier 101, 102 beyond it is prevented.

[0006] Next, actuation of the barrier style constituted in this way is explained. In the condition that power does not work in each part article of a barrier style, as shown at drawing 11, the closing motion ring 104 has rotated in the direction of a clockwise rotation according to the energization force of the actuation spring 105, and the barrier 101, 102 is in the condition of having opened.

[0007] Moreover, as shown in drawing 12, when the closing motion ring 104 rotates in the counter clockwise direction in response to Power F (the collapsing force of a zoom lens-barrel, the turning effort from a focus motor, etc. are used as power F) from a lens-barrel, open stopper 104a also rotates in the counter clockwise direction, this is interlocked with, the barrier 101, 102 rotates in the close direction, and it is a wrap about lighting hole 103a. Under the present circumstances, although what is necessary is just to set it as the amount which barrier 101, 102 comrades interlocked with this contact, and closes the lighting hole 103, the rotation (angle B) of the closing motion ring 104 needs to set up a rotation (angle B) more greatly as an amount of additional coverage, if various components precision, fitting backlash, etc. are taken into consideration.

[0008] And the absorption spring 106 acts so that it may be reasonable structural to the larger revolution. That is, when the rotation of the closing motion ring 104 is too large, parts for Arm 101b and 102b and open stopper 104a which had contacted in the state of the aperture will separate slightly in the state of closing.

[0009] Moreover, if the closing motion ring 104 tends to rotate counterclockwise when the barrier 101, 102 is not able to rotate in the direction of closing with a certain obstruction (for example, foreign matters, such as sand) during closing actuation as shown in drawing 13, the absorption spring 106 is extended further and the revolution to the counter clockwise direction of the closing motion ring 104 is permitted. That is, the absorption spring 106 permits recess migration of the closing motion ring 104 to the barrier 101, 102. It is prevented that structural failure occurs by this.

[0010] In addition, the structure of an absorption spring also has an example (refer to JP, 7-159856, A) using the torsion spring hooked on the center of rotation of the barrier in addition to a hauling spring like the above-mentioned example.

[0011]

[Problem(s) to be Solved by the Invention] However, at barrier guard using the hauling spring mentioned above as an absorption spring, in photography optical-axis directional vision, since an absorption spring cannot be arranged to an active region including the migration portion of the barrier, this becomes the constraint on a configuration and there is a problem of needing a space large as a device.

[0012] Moreover, with a hauling spring, since the space for the diameter of a volume must be left in the direction of an optical axis, this leads to the increment in the thickness direction size of a barrier style.

[0013] On the other hand, at barrier guard using the torsion spring as an absorption spring, the thickness for a number of turns is needed for the rear face of the barrier as a coil portion, and this also leads to the increment in the thickness direction size of a barrier style. Moreover, in order to make the spring force of a torsion spring act on the barrier efficiently, it is necessary to arrange the coil portion of a torsion spring to the center of rotation of the barrier, and this serves as constraint on layout and a device.

[0014] In addition, although lessening the diameter of a volume and number of turns of a hauling spring or a torsion spring, and making a required space small is also considered, the elasticity limit of a spring is exceeded in the usual actuation range, and there is a possibility that the function of a spring cannot fully be demonstrated.

[0015] Then, the 1st object of the invention in this application is offering the camera which uses the space of the premises of a barrier effectively, and prevents enlargement of the barrier style by preparing an absorption spring, and could be made to enlarge the elasticity limit of an absorption spring as much as possible.

[0016]

[Means for Solving the Problem] In order to attain the above-mentioned object, by this application 1st invention, an elastic member is incorporated inside a barrier member in barrier equipment which has a driving member which carries out closing motion actuation of a wrap barrier member and this barrier member for a front face of a taking lens, and an elastic member which absorbs recess migration of a driving member to a barrier member in the condition of having closed.

[0017] That is, an arrangement space of an elastic member in an outside of the increase of flexibility and a barrier member of layout is made unnecessary by holding an elastic member which was being conventionally arranged in an outside of a barrier member in spot facing space formed in a barrier member, and permitting going into close operating range of a barrier member in optical-axis directional vision.

[0018] In addition, it is desirable to specifically include an elastic member in a side which counters a taking lens in a barrier member, and to make it an elastic member not appear in a front face of a camera.

[0019] Moreover, it forms at a configuration (two-dimensional configuration) to which only thickness for a wire size has an elastic member in the direction of an optical axis of a taking lens with a wire rod, and, as for elastic member ***** , it is desirable to make the direction thickness of an optical axis of the whole barrier equipment as small as possible.

[0020] furthermore, it is desirable to obtain sufficient elastic-deformation permissible dose to prepare a portion at which it turned in a field (to get it blocked -- the inside of a barrier side of a barrier member) which intersects perpendicularly with an elastic member at an optical axis, using area of a barrier member as greatly as possible, enlarge an elasticity limit of an elastic member, and absorb the above-mentioned recess migration.

[0021]

[Embodiment of the Invention]

(The 1st operation gestalt) Drawing 1 - drawing 6 show the barrier style of the camera which is the 1st operation gestalt of this invention. Drawing 1 (a), drawing 2 (a), and drawing 3 (a) show barrier aperture actuation, barrier closing actuation, and barrier enforcement aperture actuation, respectively. Moreover, drawing 1 (b), drawing 2 (b), and drawing 3 (b) are drawings having expanded and shown a part for the body in drawing 1 (a), drawing 2 (a), and drawing 3 (a), respectively. Drawing 4 is a cross section when the IV-IV line in drawing 3 (b) cuts.

[0022] The main barrier 1 and the subbarrier 2 are arranged in the front face of a cope plate 3 in which lighting hole 3a was formed, and are attached in the cope plate 3 pivotable by the circumference of center-of-rotation 1a and 2a, respectively. If the main barrier 1 and the subbarrier 2 are being mutually engaged with gearing section 1b and 2b and the main barrier 1 is rotated, the turning effort will be transmitted to the subbarrier 2.

[0023] The pivotable closing motion lever 4 is attached in the rear face of a cope plate 3 by the circumference of the center of rotation of the main barrier 1 and abbreviation identitas, and this closing motion lever 4 is energized in the direction of the clockwise rotation in drawing with the actuation spring (hauling spring) 5. Stopper 3b is formed in the cope plate 3, and the revolution exceeding the predetermined location of the closing motion lever 4 is prevented. Driving shaft 4a prolonged ahead is formed in the closing motion lever 4, and this driving shaft 4a has fitted into absorption hole 1c which penetrated slot 3c formed in the cope plate 3, and was formed in the main barrier 1.

[0024] As shown in drawing 6, 1d of seat GURI sections is formed in the rear face of the main barrier 1, and the absorption spring 6 which carried out the wire-spring configuration shown in drawing 5 is held in 1d of this seat GURI section.

[0025] The absorption spring 6 consists of fixed-portion 6a by which close is fixed to slot part 1e formed in the main barrier 1, variant-part part 6c which is connected with this fixed-portion 6a, and mainly carries out elastic deformation within 1d of seat GURI sections, and right-hand-side 6b connected with variant-part part 6c. The absorption spring 6 is the configuration shown in drawing 5 as a continuous line in the state of un-deforming, in the normal state (drawing 1 (a), a condition like drawing 2 (a)) attached in the main barrier 1, deforms into the configuration shown with the dashed line, and generates the energization force shown in right-hand-side 6b by the arrow head f.

[0026] As shown in drawing 1 (b), the energization force f acts so that driving shaft 4a of the closing motion lever 4 may be made to contact the end face of absorption hole 1c of the main barrier 1. By this, the closing motion lever 4 and the main barrier 1 can rotate in one, and can rotate the subbarrier 2 further.

[0027] And in order to fully demonstrate elastic force, without the absorption spring 6 exceeding the elasticity limit, it is required to lengthen the length of variant-part part 6c, therefore 1d of seat GURI sections of the main barrier 1 uses the largest possible area on the back. And it lengthens as a curvilinear configuration where variant-part part 6c also curved according to the shape not of a straight line but the configuration of a seat GURI side. By this, although the absorption spring 6 is a torsion spring, even if there is no coil portion, a function can fully be demonstrated.

[0028] And compared with the case where the torsion spring which has a hauling spring and a coil portion is used, the thickness direction size can be made small.

[0029] Next, actuation of the barrier style constituted in this way is explained. In the condition that no power works into each portion of a barrier style, as shown in drawing 1, the closing motion lever 4 has rotated in the direction of a clockwise rotation according to the energization force of the actuation spring 5, and the main barrier 1 and the subbarrier 2 are in the condition of having opened.

[0030] As shown in drawing 2, when the closing motion lever 4 rotates in the counter clockwise direction in response to Power F (the collapsing force of a zoom lens-barrel, the turning effort from a focus motor, etc. are used as power F) from a lens-barrel, while

driving shaft 4a also rotates in the counter clockwise direction and the main barrier 1 rotates it in the counter clockwise direction united with this, the subbarrier 2 rotates in the direction of a clockwise rotation, and it is a wrap about lighting hole 3a.

[0031] Under the present circumstances, although the main barrier 1 and the subbarrier 2 should just set it as the amount opened and closed exactly essentially, if various components precision, fitting backlash, etc. are taken into consideration, the rotation (angle A) of the closing motion lever 4 needs to look at the amount of additional coverage, and needs to set up more greatly the rotation (angle A) of the closing motion lever 4. And variant-part part 6c of the absorption spring 6 deforms so that unreasonableness may not arise structural to the revolution of the larger closing motion lever 4. That is, the end-face portion of absorption hole 1c which has contacted in the state of an aperture, and driving shaft 4a will leave whether in the state of closing, it is small.

[0032] As shown in drawing 3, when the main barrier 1 or the subbarrier 2 cannot rotate in the direction of closing with a certain obstruction (for example, foreign matters, such as sand) during closing actuation, variant-part part 6c of the absorption spring 6 deforms further, and permits the revolution to the counter clockwise direction of the closing motion lever 4. Specifically, the crevice between the end faces of absorption hole 1c and driving shaft 4a which were produced in closing actuation spreads further. That is, it prevents that recess migration of the closing motion lever 4 to the main barrier 1 or the subbarrier 2 is permitted, and unreasonableness occurs structural with the absorption spring 6.

[0033] And when an obstruction etc. is lost, and right-hand-side 6b of the absorption spring 6 makes driving shaft 4a approach the end face of push and absorption hole 1c, as shown in drawing 2, the main barrier 1 and the subbarrier 2 close.

[0034] (The 2nd operation gestalt) Drawing 7 - drawing 9 show the barrier style of the camera which is the 2nd operation gestalt of this invention. This operation gestalt reverses the energization direction of the actuation spring 15 and the absorption spring 16 to the 1st operation gestalt.

[0035] Since the 1st operation gestalt is the spring which the energization direction reversed, the absorption spring 16 is the configuration shown as the continuous line of drawing 10 in the state of un-deforming, in a busy condition, as a dashed line shows, deforms and generates the energization force (arrow head f).

[0036] In the condition that no power is working to the barrier style, as shown in drawing 7, the main barrier 11 and the subbarrier 12 have closed according to the hauling force of the actuation spring 15. And revolution regulation of the closing motion lever 14 is performed when each barrier 11 and 12 closes. Therefore, in this condition, the absorption spring 16 does not generate inconvenience, even if there is nothing.

[0037] If the main barrier 11 and the subbarrier 12 open with Power F as shown in drawing 8, aperture regulation of the main barrier 11 will be made by contacting contact section 13a by which the main barrier 11 was formed in the cope plate 13. And since the large rotation of the closing motion lever 14 is taken rather than the rotation of the main barrier 1 by the aperture regulation, driving shaft 14a stops contacting the end face of absorption hole 11c of the main barrier 11 in the state of an aperture, but since the energization force of the absorption spring 16 is acting in the open direction, barrier 11 and 12 does not close.

[0038] As shown in drawing 9, when barrier 11 and 12 tends to be open and there is a certain failure, it is avoided that the absorption spring 16 deforms beyond the condition of drawing 8, the crevice Y between driving shaft 14a and the end face of absorption hole 11c becomes large (recess migration of the closing motion lever 14 to the main barrier 11 or the subbarrier 12 permitted), and unreasonableness arises structural.

[0039] In addition, the configuration of the barrier member in this invention, an absorption spring, etc. is not restricted to what was explained with each above-mentioned operation gestalt.

[0040] Moreover, this invention can be applied to cameras of various gestalten, such as a single-lens reflex camera, a lens shutter camera, and a video camera, and can be applied also to the element which constitutes further optical instruments other than a camera, other equipments, the equipment further applied to the equipment of these cameras, an optical instrument, or others, or these.

[0041] Moreover, the above operation gestalt and modification, or these technical element may be combined and used for this invention if needed.

[0042] (Relation between an operation gestalt and a claim) In the above-mentioned operation gestalt, the absorption springs 6 and 16 are equivalent to the elastic member said at a claim at the driving member which the closing motion levers 4 and 14 say to a claim at the barrier member which the Lord and the subbarrier 1, 2, 11, and 12 say to a claim, respectively.

[0043] In addition, although the above is the response relation between each configuration of this invention, and each configuration of an operation gestalt, as long as this invention is the configuration that the function which the configuration of the device which it is not restricted to the configuration of these operation gestalt, and was shown in the claim, or an operation gestalt has can be attained, it may be what kind of thing.

[0044]

[Effect of the Invention] As explained above, in this application the 1st invention, it permits holding in the spot facing space which formed the elastic member in the taking-lens side of a barrier member, and going into the close operating range of a barrier member in optical-axis directional vision. For this reason, if this invention is used, the miniaturization of barrier equipment can be attained, being able to increase the flexibility of layout and being able to use the arrangement space of the elastic member in the outside of a barrier member as unnecessary compared with the conventional barrier equipment which had regulated that an elastic member went into the close operating range of a barrier member.

[0045] Moreover, if an elastic member is formed in the direction of an optical axis of a taking lens with a wire rod at the configuration which has only the thickness for a wire size, elastic member ***** can make thinner the direction thickness of an optical axis of the whole barrier equipment.

[0046] Furthermore, if the portion at which it turned in the field which intersects perpendicularly with an elastic member at an optical axis, using the area of a barrier member as greatly as possible is prepared, the length of an elastic member can be lengthened, the elasticity limit can be enlarged, and sufficient elastic-deformation permissible dose to absorb recess migration of the driving member to a barrier member can be obtained.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the front view and the elements on larger scale having shown aperture actuation of the barrier style of the 1st operation gestalt of this invention.

[Drawing 2] It is the front view and the elements on larger scale having shown closing actuation of the barrier style of the above-mentioned 1st operation gestalt.

[Drawing 3] It is the front view and the elements on larger scale having shown compulsive closing actuation of the barrier style of the above-mentioned 1st operation gestalt.

[Drawing 4] It is the side cross section for the body of the barrier style of the above-mentioned 1st operation gestalt.

[Drawing 5] It is the front view of the absorption spring used for the barrier style of the above-mentioned 1st operation gestalt.

[Drawing 6] It is the perspective diagram which looked at the main barrier used for the barrier style of the above-mentioned 1st operation gestalt from the back side.

[Drawing 7] It is the front view having shown aperture actuation of the barrier style of the 2nd operation gestalt of this invention.

[Drawing 8] It is the front view having shown closing actuation of the barrier style of the above-mentioned 2nd operation gestalt.

[Drawing 9] It is the front view and the elements on larger scale having shown compulsive closing actuation of the barrier style of the above-mentioned 2nd operation gestalt.

[Drawing 10] It is the front view of the absorption spring used for the barrier style of the above-mentioned 1st operation gestalt.

[Drawing 11] It is the front view showing aperture actuation of the conventional barrier style.

[Drawing 12] It is the front view showing closing actuation of the conventional barrier style.

[Drawing 13] It is the front view showing compulsive closing actuation of the conventional barrier style.

[Description of Notations]

1 11 -- Main barrier

2 12 -- Subbarrier

3 13 -- Cope plate

4 14 -- Closing motion lever

5 15 -- Actuation spring (hauling spring)

6 16 -- Absorption spring (wire spring)

101, 102 -- Barrier

103 -- Cope plate

104 -- Closing motion ring

105 -- Actuation spring (hauling spring)

106 -- Absorption spring (hauling spring)

[Translation done.]

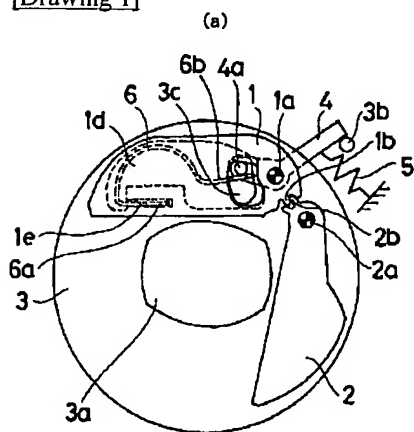
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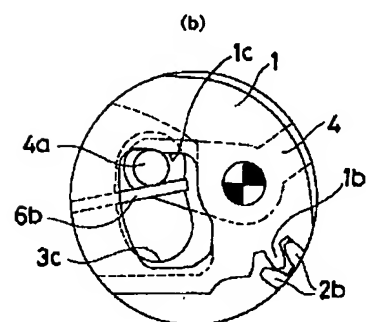
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DRAWINGS

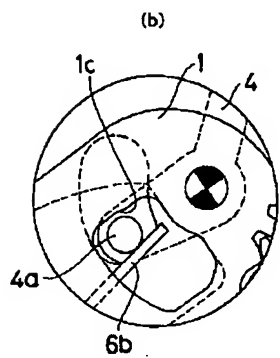
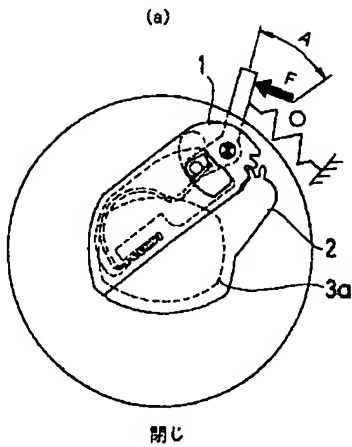
[Drawing 1]



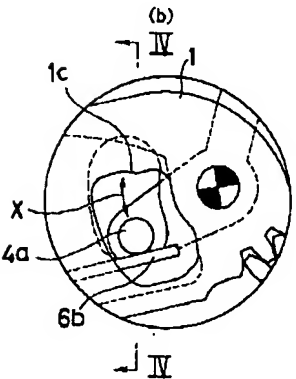
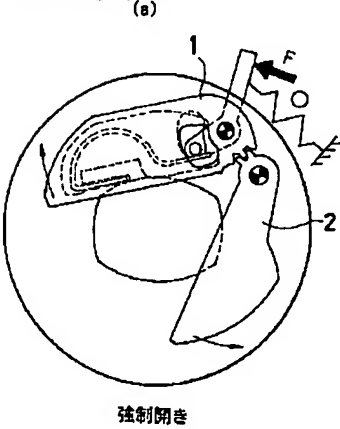
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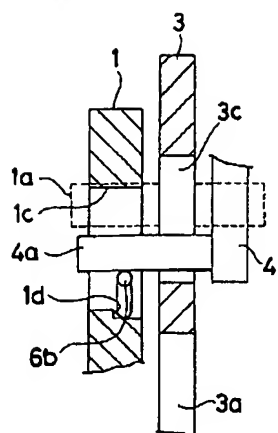
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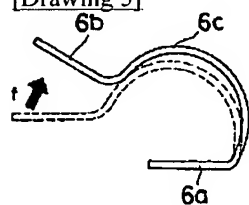
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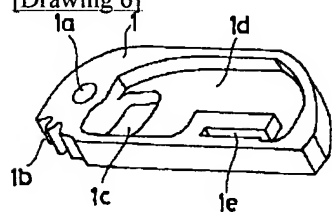
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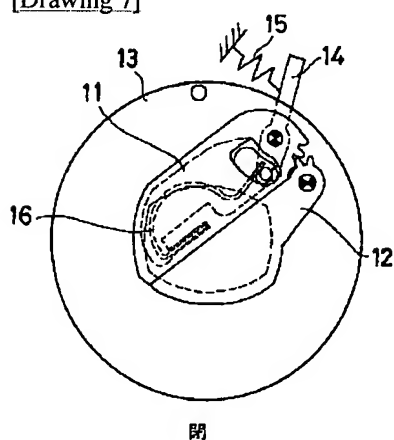
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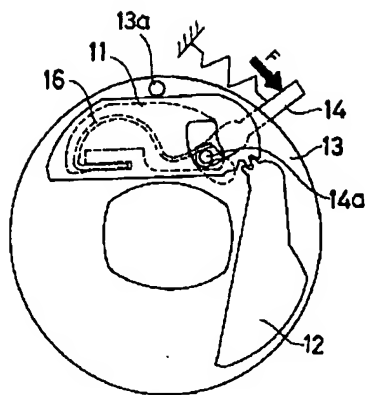
[Drawing 6]



[Drawing 7]



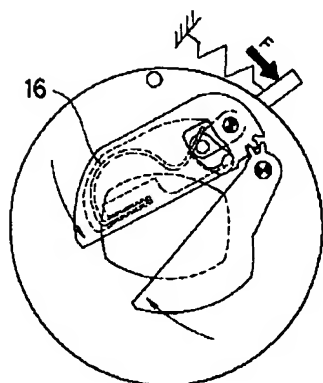
[Drawing 8]



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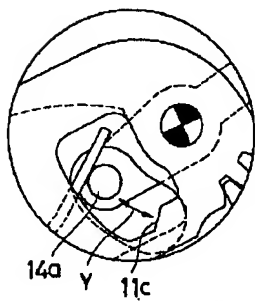
[Drawing 9]

(a)

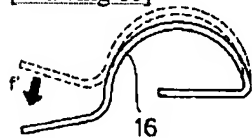


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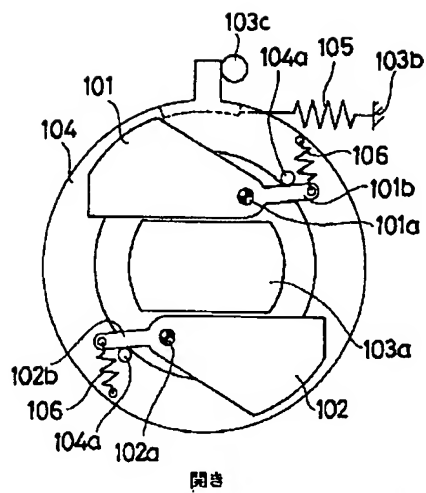
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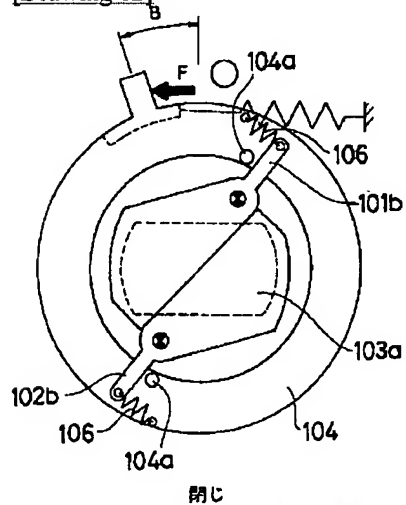
[Drawing 10]



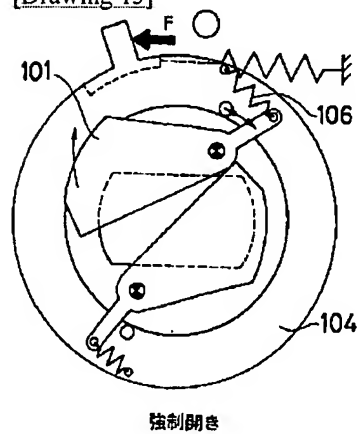
[Drawing 11]



[Drawing 12]



[Drawing 13]



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CORRECTION OR AMENDMENT

[Official Gazette Type] Printing of amendment by the convention of 2 of Article 17 of patent law

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[Year copy format] Open patent official report 9-2116

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[The 7th edition of International Patent Classification]

G03B 11/04

[FI]

G03B 11/04

B

[Procedure amendment]

[Filing Date] September 27, Heisei 13 (2001. 9.27)

[Procedure amendment 1]

[Document to be Amended] Description

[Item(s) to be Amended] 0015

[Method of Amendment] Modification

[Proposed Amendment]

[0015] Then, the object of this invention is offering the camera which uses the space of the premises of a barrier effectively, and prevents enlargement of the barrier style by preparing an absorption spring, and could be made to enlarge the elasticity limit of an absorption spring as much as possible.

[Procedure amendment 2]

[Document to be Amended] Description

[Item(s) to be Amended] 0016

[Method of Amendment] Modification

[Proposed Amendment]

[0016]

[Means for Solving the Problem] In order to attain the above-mentioned object, by this invention, an elastic member is incorporated inside a barrier member in barrier equipment which has a driving member which carries out closing motion actuation of a wrap barrier member and this barrier member for a front face of a taking lens, and an elastic member which absorbs recess migration of a driving member to a barrier member in the condition of having closed.

[Procedure amendment 3]

[Document to be Amended] Description

[Item(s) to be Amended] 0044

[Method of Amendment] Modification

[Proposed Amendment]

[0044]

[Effect of the Invention] As explained above, according to this invention, it permits holding in the spot facing space which formed the elastic member in the taking-lens side of a barrier member, and going into the close operating range of a barrier member in optical-axis directional vision. For this reason, if this invention is used, the miniaturization of barrier equipment can be attained, being able to increase the flexibility of layout and being able to use the arrangement space of the elastic member in the outside of a barrier member as unnecessary compared with the conventional barrier equipment which had regulated that an elastic member went into the close operating range of a barrier member.

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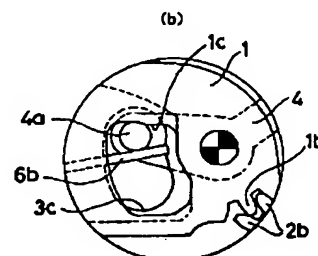
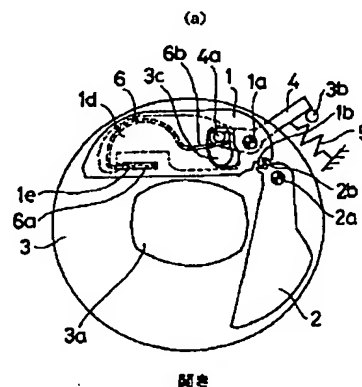
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(54) 【発明の名称】 バリア装置およびこれを備えたカメラ

(57) 【要約】

【課題】 バリア部材に対する駆動部材の逃げ移動を吸収する弾性部材の配設位置やその形状によっては、バリア装置の光軸方向厚さが増加する。

【解決手段】 閉じた状態で撮影レンズの前面を覆うバリア部材1、2と、このバリア部材を開閉駆動する駆動部材4と、バリア部材に対する駆動部材の逃げ移動を吸収する弾性部材6とを有するバリア装置において、弾性部材を、バリア部材の内側に組み込む。



【特許請求の範囲】

【請求項1】 閉じた状態で撮影レンズの前面を覆うバリア部材と、このバリア部材を開閉駆動する駆動部材と、前記バリア部材に対する前記駆動部材の逃げ移動を吸収する弾性部材とを有するバリア装置において、前記弾性部材を、前記バリア部材の内側に組み込んだことを特徴とするバリア装置。

【請求項2】 前記弾性部材を、前記バリア部材における前記撮影レンズに対向する側に組み込んだことを特徴とする請求項1に記載のバリア装置。

【請求項3】 前記弾性部材が、線材により、前記撮影レンズの光軸方向に線径分の厚さのみ有する形状に形成されていることを特徴とする請求項1又は2に記載のバリア装置。

【請求項4】 前記弾性部材が、前記光軸に直交する面内で曲がった部分を有することを特徴とする請求項3に記載のバリア装置。

【請求項5】 請求項1から4のいずれかに記載のバリア装置を備えたことを特徴とするカメラ。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 レンズ鏡筒前面に開閉可能な保護バリアを有したカメラに関する。

【0002】

【従来の技術】 カメラには、レンズ鏡筒前面に開閉可能な保護バリアを設け、撮影を行わないときにレンズが汚れたり傷付かないよう保護するものがある。

【0003】 図11～図13を用いて従来のバリア開閉機構について説明する。2枚のバリア101、102は、回転中心101a、102aを中心に回転可能に不図示の地板に固定されている。地板はレンズ鏡筒の前面に配設されており、この地板には、撮影に必要な光路を形成する採光穴103aが開けてある。さらに地板には、光軸を中心に回転可能に開閉リング104が取り付けられていて、この開閉リング104は、地板のバネ掛け部103bに引掛けられた駆動バネ（引っ張りバネ）105によって、図中時計回り方向に付勢されている。

【0004】 なお、地板には、開閉リング104がバリア101、102を開かせる位置に回転したときに、この開閉リング104のそれ以上の時計回り方向への回転を阻止する回転ストップ103cが形成されている。

【0005】 バリア101、102には、腕部101b、102bが形成されており、この腕部分101b、102bと回転リング104との間には、バリア101、102を閉方向に付勢する吸収バネ（引っ張りバネ）106が取り付けられている。また、回転リング4には開ストップ104aが形成されており、バリア101、102が開いたときに腕部101b、102bが開ストップ104aに当接することにより、それ以上のバリア101、102の開動作が阻止される。

【0006】 次に、このように構成されたバリア機構の動作を説明する。バリア機構の各部品に動力が働かない状態では、図11に示すように、駆動バネ105の付勢力によって、開閉リング104が時計回り方向に回転しきっており、バリア101、102は開いた状態にある。

【0007】 また、図12に示すように、鏡筒から動力F（ズーム鏡筒の沈胴力や合焦モータからの回転力等が動力Fとして利用される）を受けて開閉リング104が反時計回り方向に回転すると、開ストップ104aも反時計回り方向に回転し、これに連動してバリア101、102が閉方向に回転して採光穴103aを覆う。この際、開閉リング104の回転量（角度B）は、これに連動するバリア101、102同士が当接して採光穴103を閉じる量に設定すればよいのであるが、各種部品精度や嵌合ガタ等を考慮に入れると、余裕量として回転量（角度B）を大きめに設定しておく必要がある。

【0008】 そして、その大きめの回転に対し機構的に無理がないように吸収バネ106が作用する。つまり、開閉リング104の回転量が大きすぎた場合に、開き状態では当接していた腕部分101b、102bと開ストップ104aとが、閉じ状態では僅かに離れることになる。

【0009】 また、図13に示すように、バリア101、102が閉じ動作中に何らかの障害物（例えば砂等の異物）によって閉じ方向に回転できなかった場合、開閉リング104が反時計方向に回転しようすると、吸収バネ106がさらに伸びて開閉リング104の反時計回り方向への回転を許容する。すなわち、吸収バネ106は、バリア101、102に対する開閉リング104の逃げ移動を許容する。これにより、機構的な故障が発生するのが防止される。

【0010】 なお、吸収バネの構造は、上記例のような引っ張りバネ以外に、バリアの回転中心に引っ掛けられたトーションバネを用いた例（特開平7-159856号公報参照）もある。

【0011】

【発明が解決しようとする課題】 しかしながら、上述した引っ張りバネを吸収バネとして用いたバリア機構では、撮影光軸方向視において、バリアの移動部分も含めた動作領域に吸収バネを配置することができないため、このことが構成上の制約になり、機構として広いスペースを必要とするという問題がある。

【0012】 また、引っ張りバネでは、巻き径分のスペースを光軸方向に空けなければならないので、このことがバリア機構の厚み方向寸法の増加につながる。

【0013】 一方、トーションバネを吸収バネとして用いたバリア機構では、コイル部分としてバリアの裏面に巻き数分の厚みを必要とし、これもバリア機構の厚み方向寸法の増加につながる。また、トーションバネのバネ

力を効率良くバリアに作用させるためには、トーションバネのコイル部分をバリアの回転中心に配置させることが必要となり、このことが設計上および機構上の制約となる。

【0014】なお、引っ張りバネやトーションバネの巻き径や巻き数を少なくして必要なスペースを小さくすることも考えられるが、通常の作動範囲でバネの弾性限界を越えてしまい、バネの機能を十分に発揮させることができないおそれがある。

【0015】そこで、本願発明の第1の目的は、バリア機構内のスペースを有効利用して、吸収バネを設けることによるバリア機構の大型化を防止し、かつ吸収バネの弾性限界をできるだけ大きくできるようにしたカメラを提供することである。

【0016】

【課題を解決するための手段】上記の目的を達成するために、本願第1の発明では、閉じた状態で撮影レンズの前面を覆うバリア部材と、このバリア部材を開閉駆動する駆動部材と、バリア部材に対する駆動部材の逃げ移動を吸収する弾性部材とを有するバリア装置において、弾性部材を、バリア部材の内側に組み込んでいる。

【0017】すなわち、従来バリア部材の外側に配設していた弾性部材を、バリア部材に形成した座ぐり空間等に収容して、光軸方向視においてバリア部材の開動作範囲に入ることを許容することにより、設計の自由度を増し、かつバリア部材の外側における弾性部材の配置スペースを不要としている。

【0018】なお、具体的には、弾性部材を、バリア部材における撮影レンズに対向する側に組み込んで、カメラの前面に弾性部材が現れないようにするのが望ましい。

【0019】また、弾性部材を、線材により、撮影レンズの光軸方向に線径分の厚さのみ有する形状（2次元的な形状）に形成して、弾性部材ひいてはバリア装置全体の光軸方向厚さをできるだけ小さくするのが望ましい。

【0020】さらに、バリア部材の面積をできるだけ大きく使って、弾性部材に光軸に直交する面内（つまりはバリア部材のバリア面内）で曲がった部分を設け、弾性部材の弾性限界を大きくして、上記逃げ移動を吸収するのに十分な弾性変形許容量を得るのが望ましい。

【0021】

【発明の実施の形態】

（第1実施形態）図1～図6は、本発明の第1実施形態であるカメラのバリア機構を示している。図1（a）、図2（a）および図3（a）はそれぞれ、バリア開き動作、バリア閉じ動作およびバリア強制開き動作を示している。また図1（b）、図2（b）および図3（b）はそれぞれ、図1（a）、図2（a）、図3（a）における主要部分を拡大して示した図である。図4は、図3（b）におけるIV-IV線で切断した場合の断面図であ

る。

【0022】主バリア1と副バリア2は、採光穴3aが形成された地板3の前面に配置されており、それぞれ回転中心1a、2a回りで回転可能に地板3に取り付けられている。主バリア1と副バリア2とは歯車部1b、2bで互いに係合していて、主バリア1を回転させると、その回転力が副バリア2に伝達される。

【0023】地板3の裏面には、主バリア1と略同一の回転中心回りで回転可能な開閉レバー4が取り付けられており、この開閉レバー4は駆動バネ（引っ張りバネ）5によって図中時計回り方向に付勢されている。地板3にはストッパ3bが形成されており、開閉レバー4の所定位置を超える回転を阻止している。開閉レバー4には前方に延びる駆動軸4aが形成されており、この駆動軸4aは地板3に形成された長穴3cを貫通して主バリア1に形成された吸収穴1cに嵌合している。

【0024】図6に示すように、主バリア1の裏面には、座ぐり部1dが形成されており、この座ぐり部1dには、図5に示す線バネ形状をした吸収バネ6が収容されている。

【0025】吸収バネ6は、主バリア1に形成された溝部分1eに入って固定される固定部分6aと、この固定部分6aにつながって座ぐり部1d内で主として弾性変形をする変形部分6cと、変形部分6cにつながる動作部6bとから構成されている。吸収バネ6は、未変形状態では図5に実線で示す形状になっていて、主バリア1に取り付けられた通常状態（図1（a）、図2（a）のような状態）では破線で示した形状に変形し、動作部6bに矢印fで示す付勢力を発生する。

【0026】付勢力fは、図1（b）に示すように、開閉レバー4の駆動軸4aを主バリア1の吸収穴1cの端面に当接させておくように作用する。これによって、開閉レバー4と主バリア1とが一体的に回転することができ、更に副バリア2を回転させることができる。

【0027】そして、吸収バネ6がその弾性限界を越えることなく、弾性力を十分に発揮するためには、変形部分6cの長さを長くすることが必要であり、そのために、主バリア1の座ぐり部1dは裏面のできるだけ広い面積を用いている。しかも、変形部分6cも直線状ではなく、座ぐり面の形状に合わせて湾曲した曲線形状として長くしている。これによって、吸収バネ6はトーションバネではあるが、コイル部分がなくても十分に機能を発揮することができる。

【0028】しかも、引っ張りバネやコイル部分を有するトーションバネを用いる場合に比べて、厚さ方向寸法を小さくすることができる。

【0029】次に、このように構成されたバリア機構の動作について説明する。バリア機構の各部分に何の動力も働かない状態では、図1に示すように駆動バネ5の付勢力によって、開閉レバー4が時計回り方向に回転しき

っており、主バリア1および副バリア2は開いた状態にある。

【0030】図2に示すように鏡筒から動力F（ズーム鏡筒の沈胴力や合焦モータからの回転力等が動力Fとして利用される）を受けて開閉レバー4が反時計回り方向に回転すると、駆動軸4aも反時計回り方向に回転し、これと一体となって主バリア1が反時計回り方向に回転するとともに副バリア2が時計回り方向に回転し、採光穴3aを覆う。

【0031】この際、開閉レバー4の回転量（角度A）は、本来主バリア1および副バリア2が丁度開閉する量に設定すればよいが、各種部品精度や嵌合ガタ等を考慮に入れると、余裕量を見て開閉レバー4の回転量（角度A）を大きめに設定しておく必要がある。そして、その大きめの開閉レバー4の回転に対し機構的に無理が生じないように吸収バネ6の変形部分6cが変形する。つまり、開き状態では当接している吸収穴1cの端面部分と駆動軸4aとが、閉じ状態では僅か離れることになる。

【0032】図3に示すように、主バリア1または副バリア2が閉じ動作中に何らかの障害物（例えば砂等の異物）によって閉じ方向に回転できない場合は、吸収バネ6の変形部分6cがさらに変形して開閉レバー4の反時計回り方向への回転を許容する。具体的には、閉じ動作で生じた吸収穴1cの端面と駆動軸4aとの間の隙間がさらに広がる。すなわち、吸収バネ6によって、主バリア1または副バリア2に対する開閉レバー4の逃げ移動が許容され、機構的に無理が発生するのを防止する。

【0033】そして、障害物などがなくなった場合には、吸収バネ6の動作部6bが駆動軸4aを押し、吸収穴1cの端面に接近させることによって、図2に示すように主バリア1および副バリア2が閉じる。

【0034】（第2実施形態）図7～図9は、本発明の第2実施形態であるカメラのバリア機構を示している。本実施形態は第1実施形態に対し、駆動バネ15と吸収バネ16の付勢方向を逆転させたものである。

【0035】吸収バネ16は第1実施形態とは付勢方向の逆転したバネであるので、未変形状態では図10の実線で示す形状になっていて、使用状態では破線で示すように変形して、付勢力（矢印f'）を発生する。

【0036】バリア機構に何の動力も働いていない状態では、図7に示すように駆動バネ15の引っ張り力によって、主バリア11および副バリア12は閉じている。そして、開閉レバー14の回転規制は各バリア11、12が閉じることによって行われる。従って、この状態では吸収バネ16はなくても不都合は発生しない。

【0037】図8に示すように、動力Fによって主バリア11および副バリア12が開くと、主バリア11が地板13に形成された当接部13aに当接することによって主バリア11の開き規制がなされる。そして、その開き規制による主バリア1の回転量よりも開閉レバー14

の回転量を大きくとってあるので、開き状態では駆動軸14aは主バリア11の吸収穴11cの端面と当接しなくなるが、吸収バネ16の付勢力が開方向に作用しているため、バリア11、12が閉じてしまうことはない。

【0038】図9に示すように、バリア11、12が開こうとしている時に、何らかの障害があった場合に、図8の状態以上に吸収バネ16が変形して駆動軸14aと吸収穴11cの端面との隙間Yが大きくなって（主バリア11または副バリア12に対する開閉レバー14の逃げ移動が許容され）、機構的に無理が生ずるのが回避される。

【0039】なお、本発明におけるバリア部材や吸収バネ等の形状は、上記各実施形態にて説明したものに限られるものではない。

【0040】また、本発明は、一眼レフカメラ、レンズシャッターカメラ、ビデオカメラ等、種々の形態のカメラに適用することができ、さらにはカメラ以外の光学機器やその他の装置、さらにはそれらカメラや光学機器やその他の装置に適用される装置またはこれらを構成する要素に対しても適用することができる。

【0041】また、本発明は、以上の実施形態および変形例、またはそれら技術要素を必要に応じて組み合わせる用いてもよい。

【0042】（実施形態と請求の範囲との関係）上記実施形態において、主および副バリア1、2、11、12が請求の範囲にいうバリア部材に、開閉レバー4、14が請求の範囲にいう駆動部材に、吸収バネ6、16が請求の範囲にいう弾性部材にそれぞれ相当する。

【0043】なお、以上が本発明の各構成と実施形態の各構成の対応関係であるが、本発明はこれら実施形態の構成に限られるものではなく、請求項に示した機構または実施形態の構成が持つ機能が達成できる構成であればどのようなものであってもよい。

【0044】

【発明の効果】以上説明したように、本願第1の発明では、弾性部材をバリア部材の撮影レンズ側に形成した座ぐり空間等に収容して、光軸方向視においてバリア部材の開動作範囲に入ることを許容している。このため、本発明を用いれば、弾性部材がバリア部材の開動作範囲に入ることを規制していた従来のバリア装置に比べて、設計の自由度を増すことができ、またバリア部材の外側における弾性部材の配置スペースを不要としてバリア装置の小型化を図ることができる。

【0045】また、弾性部材を、線材により、撮影レンズの光軸方向に線径分の厚さのみ有する形状に形成すれば、弾性部材ひいてはバリア装置全体の光軸方向厚さをより薄くすることができる。

【0046】さらに、バリア部材の面積をできるだけ大きく使って、弾性部材に光軸に直交する面で曲がった部分を設ければ、弾性部材の長さを長くしてその弾性限

界を大きくすることができ、バリア部材に対する駆動部材の逃げ移動を吸収するのに十分な弾性変形許容量を得ることができる。

【図面の簡単な説明】

【図1】本発明の第1実施形態のバリア機構の開き動作を示した正面図および部分拡大図である。

【図2】上記第1実施形態のバリア機構の閉じ動作を示した正面図および部分拡大図である。

【図3】上記第1実施形態のバリア機構の強制閉じ動作を示した正面図および部分拡大図である。

【図4】上記第1実施形態のバリア機構の主要部分の側面断面図である。

【図5】上記第1実施形態のバリア機構に用いられる吸収バネの正面図である。

【図6】上記第1実施形態のバリア機構に用いられる主バリアを背面側から見た斜視図である。

【図7】本発明の第2実施形態のバリア機構の開き動作を示した正面図である。

【図8】上記第2実施形態のバリア機構の閉じ動作を示した正面図である。

【図9】上記第2実施形態のバリア機構の強制閉じ動作

を示した正面図および部分拡大図である。

【図10】上記第1実施形態のバリア機構に用いられる吸収バネの正面図である。

【図11】従来のバリア機構の開き動作を示す正面図である。

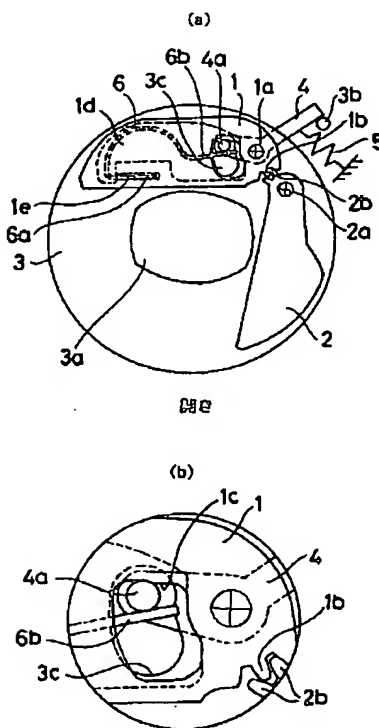
【図12】従来のバリア機構の閉じ動作を示す正面図である。

【図13】従来のバリア機構の強制閉じ動作を示す正面図である。

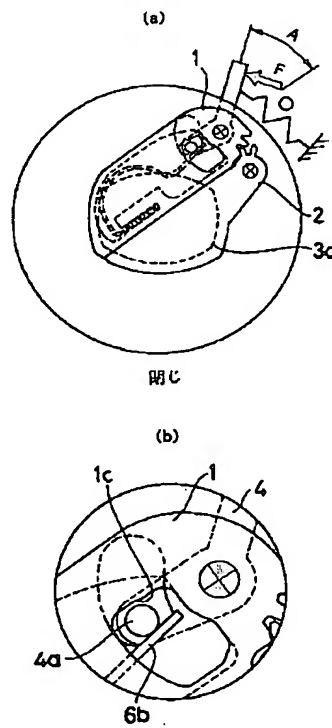
【符号の説明】

- 1, 11…主バリア
- 2, 12…副バリア
- 3, 13…地板
- 4, 14…開閉レバー
- 5, 15…駆動バネ（引っ張りバネ）
- 6, 16…吸収バネ（線バネ）
- 101, 102…バリア
- 103…地板
- 104…開閉リング
- 105…駆動バネ（引っ張りバネ）
- 106…吸収バネ（引っ張りバネ）

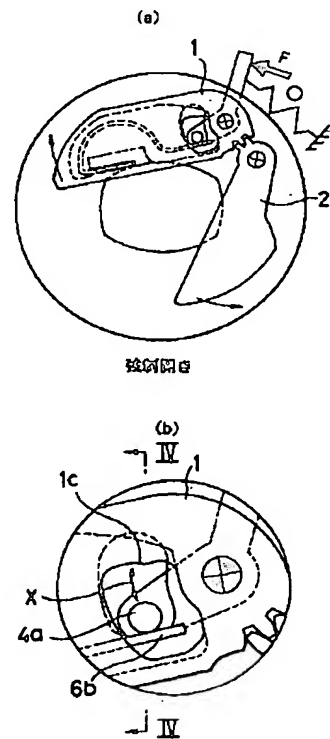
【図1】



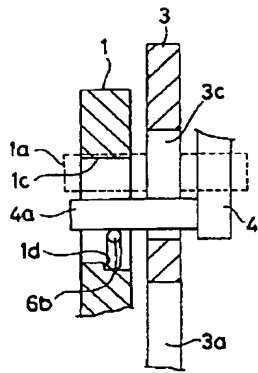
【図2】



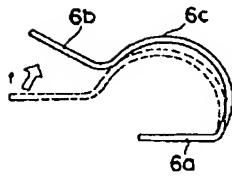
【図3】



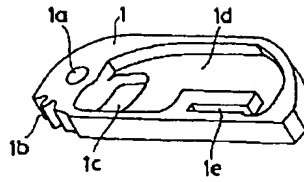
【図4】



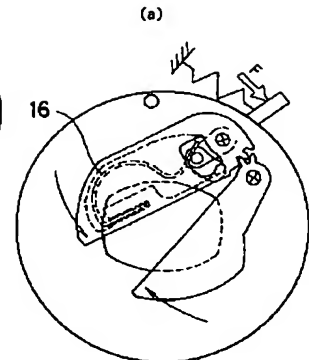
【図5】



【図6】

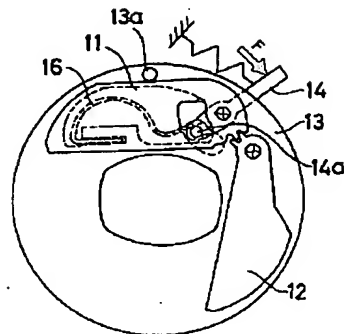


【図9】



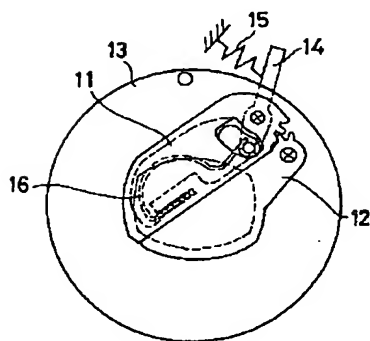
磁気閉じ

【図8】



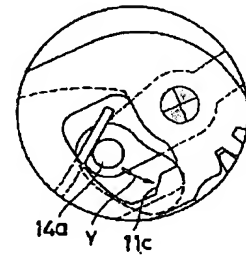
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【図7】



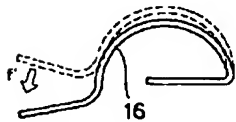
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(b)

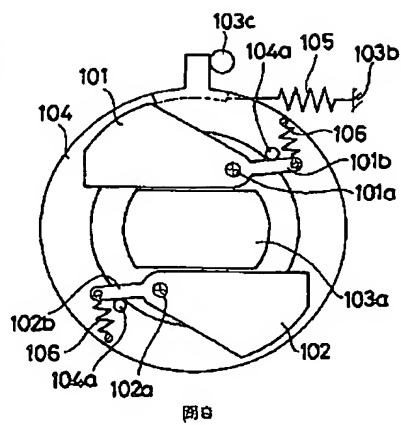


【図12】

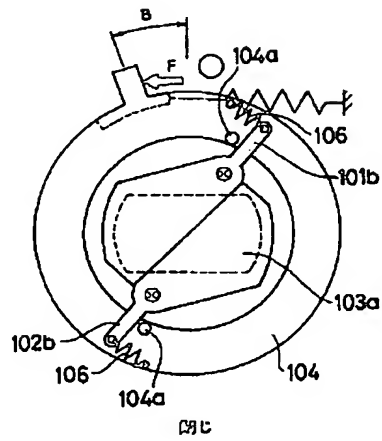
【図10】



【図11】



閉



閉

【図13】

